A Pocket Guide to *Kansas Freshwater Mussels*

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Rock Pocketbook

Cover Photo:
Western Fanshell
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Purple Wartyback

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Bleufer

Introduction

Freshwater mussels (Mollusca: Unionacea) are a fascinating group of animals that reside in our streams and lakes. They are front-line indicators of environmental quality and have ecological ties with fish to complete their life cycle and colonize new habitats. As filter-feeders, they can help improve both water quality and clarity, and they are an important part of the aquatic food web. Please do not confuse our native mussels with two exotic nuisance or "weed" species that have spread into Kansas, the Asiatic clam and zebra mussel (pages 65-66).

As this guide portrays, Kansas is the home of 40 living species of native freshwater mussels. Another 8 species were here in the past but are no longer found in our rivers, streams and lakes (see extirpated species; pages 57-64). Over half of the extant species are listed as threatened (T), endangered (E) or species-in-need-of-conservation (SINC). This is not surprising, because freshwater mussels have been identified as one of the most imperiled groups of animals in North America. The major threats to mussels are pollution, dewatering of streams, stream channelization and dams. Improvements in water quality through the diligent prevention of point and nonpoint source pollution, combined with adequate flow, are essential to help these unique invertebrates continue to make our rivers, streams and lakes their home in the future.

The purpose of this guide is to show the diversity, range and beauty of freshwater mussels in Kansas. It is hoped once your interest is piqued, other sources of information will be sought to learn more about these mollusks. Some useful references are listed in the back of this pocket guide. The range maps are based on museum collection vouchers, Kansas Department of Health and Environment sampling data and Kansas Department of Wildlife and Parks stream surveys. We also provide a glossary (page 67) to help with the unique terminology used to describe the anatomy and life history of these animals.

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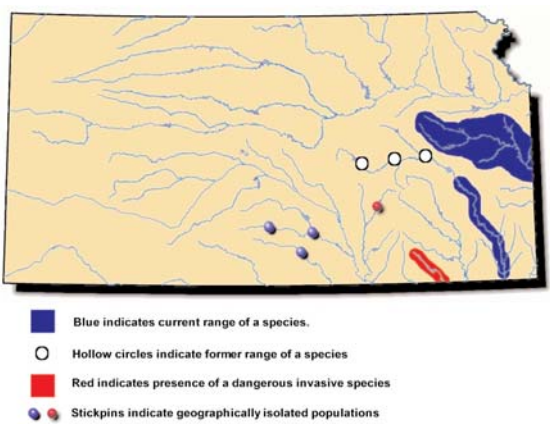
Freshwater mussels from the Verdigris River


Blue indicates current range of a species.
Hollow circles indicate former range of a species
Red indicates presence of a dangerous invasive species
Stickpins indicate geographically isolated populations

Buttons and Pearls

In the past, freshwater mussels were of great value to Indian tribes as food and the shells were utilized as tools. More recent uses of the shells were in the production of buttons and cultured pearls.

Occasionally, someone will find an old, chalky shell with perfectly round holes in it. These shells are artifacts from the pearl-button industry. The buttons weren't made from pearls but from the nacre (mother-of- pearl) of the shell. Several

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species with white nacre and sufficient shell thickness were used in the industry. A hollow drill was used to produce button blanks, which were then polished and thread holes were bored. White buttons on old dresses and shirts made before the 1940s probably are made from mussel shells.

The button industry started with a German immigrant, John Boepple, who settled in Muscatine, Iowa in the 1890s. He developed the technique of making buttons from mussel shells. The industry grew rapidly and soon the expansive Mississippi River mussel beds were depleted. For example, one mussel bed near New Boston, Illinois reportedly yielded 10,000 tons of shells. The industry spread as far west as eastern Kansas.

Button factories were located along the Neosho River in Iola, Oswego and Chetopa. The factory in Iola processed up to 18 tons of shells in one week in 1922. By the late 1940s, mussel beds were depleted, plastic buttons became a widely accepted substitute and the mother-of-pearl button industry faded away.

Freshwater mussels rarely produce natural pearls. They were once a highly valued item and an indicator of affluence. Reportedly, there were two freshwater pearls found in the upper Mississippi River that sold for $50,000 and $65,000 in 1902. However, the scarcity of pearls changed with a Japanese innovation developed by Kokichi Mikimoto in 1893. He perfected the technique of consistently producing cultured pearls by implanting mother-of-pearl pellets cut from freshwater mussels into pearl oysters.

Beginning in the 1960s, the Japanese demand for shells needed to supply the nuclei of cultured pearls raised the value of freshwater mussel shells enough to fuel an export business. By 1978, seven million pounds of shells were exported from the United States and nearly all ended up in Japan. Once there, the thick white shells were milled to form spheres that would be implanted into pearl oysters. Eventually the implants would take on the luster of the pearl oyster and they would be removed and sold to jewelers as cultured pearls.

In Kansas, the southeastern rivers are commercially harvested for three species of mussels; threeridge, mapleleaf and monkeyface. Just over 1.5 million pounds of threeridge shells and over 2.3 million pounds of total shells were removed from Kansas waters for export trade between 1989 and 2001. In 2003, Kansas Department of Wildlife and Parks imposed a ten-year moratorium on commercial harvest to evaluate the effect of this activity on mussel populations.

Freshwater Mussel Reproduction

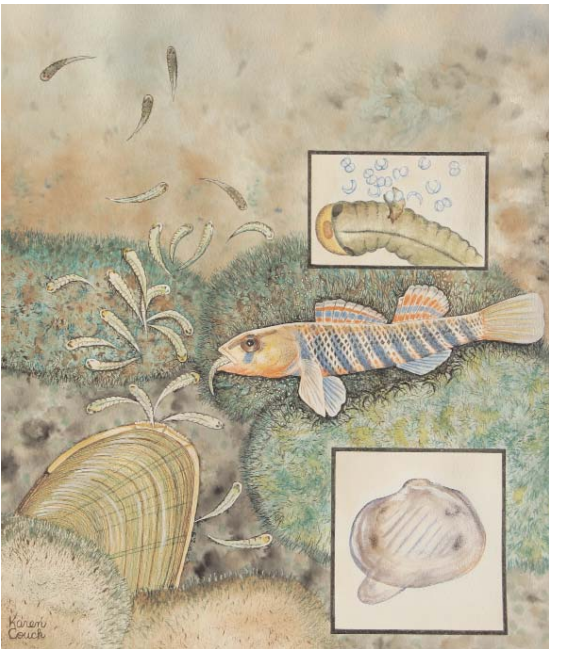
The male mussel sheds his gametes (sperm) into the water where they are dispersed. The sperm enter the female as she siphons water through her gills. The female's eggs are located in the water tubes of the gills. Here they are fertilized and develop into glochidia, which are the larval form of the mussel. This embryonic stage is not fully formed and does not possess a completely developed organ system.

The next important step in the successful continuation of the mussel's complex life cycle is the attachment of the glochidia onto a host fish's gills or fins. Most mussel species must do this in order for the glochidia to transform into juvenile mussels. In some mussel species, several different fish species are suitable for the glochidia's parasitic stage. For other mussel species, only one fish species will make an acceptable host. Mussels have various means of getting glochidia onto the right fish host, including "lures" that mimic aquatic larval insects, small fish, worms and crayfish. Other mussel species release their glochidia within fine strands resembling webs.

The following pages show two examples of this complex relationship.

Reproduction of the Ouachita Kidneyshell

The Ouachita kidneyshell (*Ptychobranchus occidentalis*) is in the subfamily Lampsilinae. This species forms its glochidia (larval offspring) into packets called "conglutinates." These conglutinates are arranged in neat rows along the outer gills, and resemble small fish or larval insects. The female mussel expels the conglutinates from her excurrent siphon. If the ruse works, then the mussel's hungry host fish will take the conglutinate as a potential food item. Movement of the "bait" is enhanced due to the fact that the "tail" portion of each packet has a sticky thread which attaches to rocks and twigs, thus causing the lure to twirl with the water current. The orangethroat darter, shown here, attempts to eat the packet, ruptures it near the eyespots (upper inset) and releases the microscopic glochidia. The tiny larval mussels clamp down on the fish's gill filaments where they encyst and metamorphose into juvenile mussels. The time involved in the transformation process varies according to water temperature and other factors, but can be from just a few days to several weeks. After transforming into juvenile mussels, they drop off the fish. As long as the habitat is suitable, they will grow and develop into adults to continue the life cycle. The lower inset shows a tiny juvenile mussel recently excysted from the host fish; the shell is nearly transparent. The greenside darter is also a potential host fish for the Ouachita kidneyshell in Kansas.



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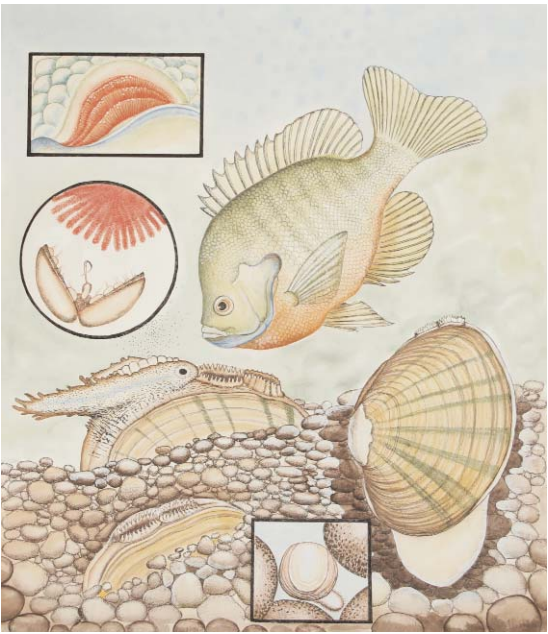
Reproduction of the Plain Pocketbook

The plain pocketbook (*Lampsilis cardium*) is in the subfamily *Lampsilinae*. Female mussels of this species, and many others within the genus Lampsilis, have a portion of their mantle flap that extends well beyond the shell's edge to form a lure. This extension is shaped like a small fish and is typically ruffled to have "fins" and a "tail." Variations in shading of color, including "eyespots," make this lure very convincing to a potential host. Situated very near the mussel's gill brooding pouches, the lure is displayed when the glochidia are ready for a fish host. The lure quivers and flicks to attract fish. Fish hosts for the plain pocketbook include the bluegill (shown here), largemouth and smallmouth bass, sauger, walleye, white crappie and yellow perch. The fish bites the lure, but instead of real food, it gets a mouthful of glochidia. Respiration of the fish passes water and glochidia over the gills where the glochidia quickly snap shut and attach. The top inset shows a single glochidium and fish's gill tissue (both highly magnified) before attachment and encystment. The bottom inset shows a newly transformed juvenile mussel, complete with a tiny foot and other organs.



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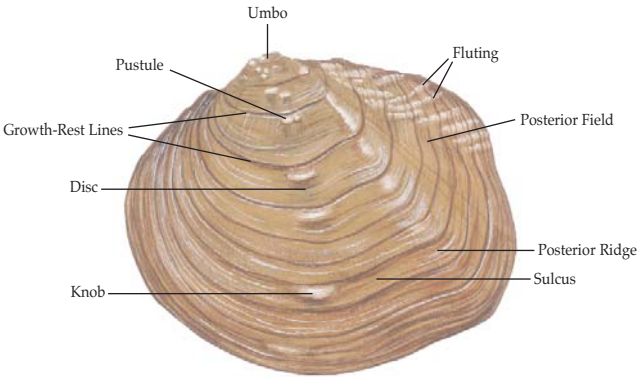
Parts of a Mussel Shell



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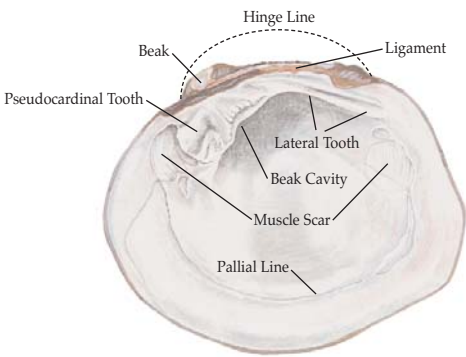

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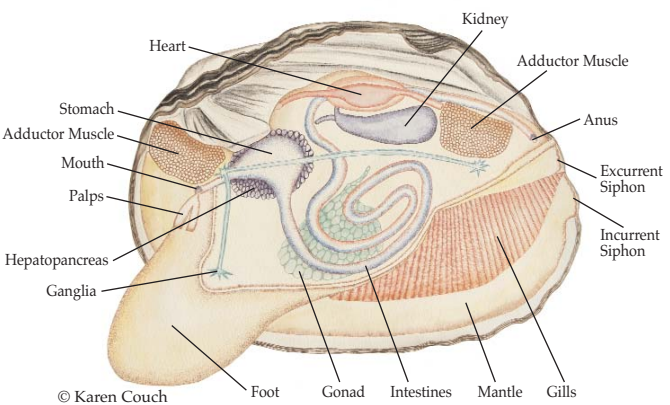
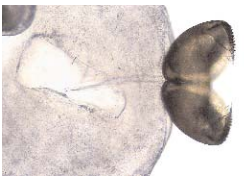
Internal Anatomy

This simplified illustration shows the arrangement of the soft tissue body parts of a freshwater mussel. The **adductor muscles** function to close the two halves of the shell. The **mantle** surrounds the visceral mass and covers the interior surface of the shell. The mantle also manufactures the shell itself, which is mostly composed of calcium carbonate. Water enters the mantle cavity through the **incurrent siphon**. Mucus secreted by the **gills** traps food which moves to the **palps**, is passed to the **mouth** and is digested in the **stomach**. The **intestines** continue to the **anus**, where waste is carried out the **excurrent siphon**. Water circulation also provides oxygen exchange in the gill tubes and on the gill's outer surface. Mussels have two pairs of gills; one pair rests in each shell valve. Other organs of the mussel include the **hepatopancreas**, **gonad**, **kidney** and a 2-chambered **heart**. The nervous system consists of **ganglia**. The **foot** extends from between the two shell halves and is used for movement and to anchor the animal in the substrate.



Subfamily Anodontinae

The mussels of this group have very minimal hinge teeth as adults or none at all. The glochidia possess a pair of hooks that enable them to clamp onto external features of host fish such as fins and scales.



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This image shows a hooked glochidium attached to a conglutinate released from a female creeper. If a fish passes by, the glochidium will attempt to snap shut on the fish's fin. If successful, it will encyst under the skin and metamorphose to the juvenile stage before dropping off. The probability of attachment to a host fish is very low, yet it is a critical stage in the life cycle of a freshwater mussel.

© Edwin Miller

Elktoe

Elktoe

Alasmidonta marginata

Kansas status: Endangered

Comments: The elktoe is a beautifully marked, relatively thin-shelled mussel with narrow rays and spots on a background of bright, yellowish-green. It typically lives in swift-flowing riffles with stable gravel or gravel-sand substrates. Freshwater mussels have an extendible foot used for locomotion. In the elktoe, it is orange and elongated. Although rare, this mussel is found in the Spring and Marais des Cygnes rivers.

Fish hosts: white sucker, northern hogsucker, shorthead redhorse and warmouth

Length: to 5 inches

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Flat Floater

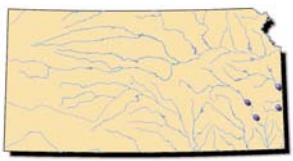
Anodonta suborbiculata

Kansas status: Endangered

Comments: Relative to other mussels, the flat floater is a short-lived species (8-12 years). Its thin, yellowish-green shell is smooth, shiny and nearly circular. There are no interlocking teeth to help hold its two valves together. This mussel prefers the soft mud of oxbow lakes and ponds occasionally flooded by the Neosho and Marais des Cygnes rivers. In late winter a female releases mucous strands laced with glochidia. When a fish swims through this "web," some of the glochidia clamp down on the fish's fins. If the fish is a suitable host and a spring flood occurs, the fish will carry these "hitchhikers" to invade other oxbow habitats where they drop off and grow.

Fish hosts: white crappie, warmouth, largemouth bass, golden shiner and mosquitofish

Length: to 8 inches



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■ *Cylindrical Papershell*

Cylindrical Papershell

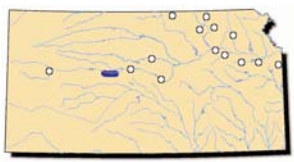
Anodontoides ferussacianus

Kansas status: Species-in-need-of-conservation

Comments: This mussel has a straw-colored, thin shell with a smooth and shiny exterior. Young shells reveal fine V-ridges on the umbo. The nacre is white. While most of the mussels in Kansas are found in the southeastern part of the state, the cylindrical papershell's range was across the northern half of Kansas. Relic shells have been found in the Kansas, Saline, Nemaha and Blue rivers. Currently, the only remaining population exists in a short stretch of the Smoky Hill River. Low to non-existent stream flow rates threaten the remaining population in Kansas.

Fish hosts: bluntface shiner, fathead minnow, white crappie and black crappie

Length: to 3½ inches



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Rock Pocketbook

Arcidens confragosus

Kansas status: Threatened

Comments: The rock pocketbook has a dark, greenish-brown to black shell. It largely resembles the more common threeridge but has a thinner shell. There are also two rows of protruding knobs located on the umbos of the rock pocketbook which help anchor it in the substrate. This mussel inhabits slow-moving rivers with muddy substrates. It is a rare Kansas mussel found only in the Marais des Cygnes River and Pottawatomie Creek.

Fish hosts: freshwater drum, white crappie, gizzard shad, channel catfish and American eel

Length: to 6 inches

© Bob Gress

White Heelsplitter

White Heelsplitter

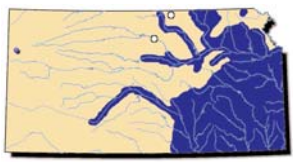
Lasmigona complanata

Kansas status: Common in eastern Kansas

Comments: The white heelsplitter is a large flattened mussel shaped similar to a dinner plate with a flat, narrow-edged wing extending from the dorsal margin. As its name implies, this wing is so narrow-edged it could split your heel if you stepped on it with a bare foot. It has notable fine ridges on the umbo that resemble the number 3. Internally, this shell is entirely white with undeveloped lateral teeth that fail to interlock. This mussel is often found in the pools or slow runs of rivers, small perennial creeks and even reservoirs.

Fish hosts: banded killifish, common carp, green sunfish, orangespotted sunfish, largemouth bass and white crappie

Length: to 8 inches



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Flutedshell

Flutedshell

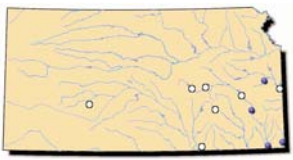
Lasmigona costata

Kansas status: Threatened

Comments: The flutedshell can be best identified by the wavy flutings on its posterior end. These flutes alternate in rounded hills and valleys resembling corrugations. The shell's lateral teeth are absent or so reduced they do not interlock. In Kansas, the flutedshell can be found in riverbeds of mostly gravel and moderate current within the Spring and Neosho rivers. It was formerly found in the Marais des Cygnes River but there are recent records from Pottawatomie Creek. Also, there is a 1942 record from Hodgeman County. The native fish hosts are interesting because they are relatively unrelated, belonging to four different fish families.

Fish hosts: largemouth bass, banded darter, northern hogsucker and common carp

Length: to 5½ inches



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Floater

Floater

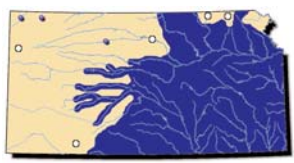
Pyganodon grandis

Kansas status: Common in eastern Kansas

Comments: The floater's shell varies from tan to dark greenish-brown then to dark brown in the older shells. It has no interlocking teeth. The large umbos are centered on the shell and give the floater an inflated appearance. This mussel largely inhabits calm water of mud, silt or sand substrate, therefore, it is usually found in ponds, oxbows, reservoirs and slow pools of streams. Unlike most freshwater mussels that may live decades, the floater lives only about 10 years. It gets its name from the supposed ability to float in the water to move to a new location if conditions deteriorate. These mussels have been seen floating but they were already dead. Evidently, the trapped gases of decomposition cause this mussel to float.

Fish hosts: common carp, bluegill, white and black crappie, gizzard shad, golden shiner, common shiner, creek chub, white sucker, yellow bullhead, green and longear sunfish, largemouth bass and freshwater drum

Length: to 10 inches



© Edwin Miller

Creeper

Creeper

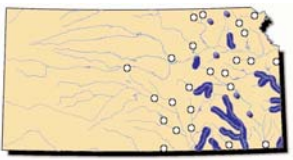
Strophitus undulatus

Kansas status: Species-in-need-of-conservation

Comments: The creeper has a thin, oval-shaped shell that causes the mussel to feel light for its size. Young shells are frequently yellow, rayed with green, turning dark brown to black with age. Internally, the nacre is also variable in color from cream to white, bluish-white or even salmon-colored. The lateral teeth are reduced and do not interlock. The creeper resides in most southeast Kansas streams with permanent flow. Some research suggests this species' glochidia do not require a fish host, but they will attach to a fish if given the opportunity.

Fish hosts: spotfin shiner, sand shiner, bluntnose minnow, fathead minnow, black bullhead, yellow bullhead, bluegill, largemouth bass, fantail darter, banded darter and walleye

Length: to 4½ inches



© Bob Gress

Paper Pondshell

Paper Pondshell

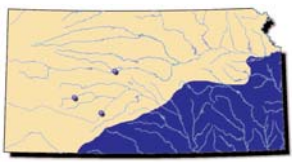
Utterbackia imbecillis

Kansas status: Common in southeastern Kansas

Comments: As the name implies, the paper pondshell has a paper-thin shell and can be found in ponds. The shell is yellow to greenish-yellow and often cracks upon drying so is easily broken. Internally, there are no interlocking teeth and the nacre is whitish-blue and iridescent. This species inhabits still waters, thus is largely found in isolated ponds, oxbows, backwaters and permanent pools. It is well adapted to mud substrates. Its shells are usually found along shores where raccoons, muskrats and birds have used them for food.

Fish hosts: mosquitofish, bluegill, green sunfish, warmouth, bluegill, longear sunfish, largemouth bass and creek chub

Length: to 3¾ inches



Subfamily Ambleminae

All members of this group have very thick shells with well-developed hinge teeth. The glochidia all lack hooks and therefore encyst on the gills of the host fish. Several species produce conglutinates (worm-like lures) that are released into the water column. These often mimic food items fish prefer. For this reason most have a large array of suitable fish hosts.

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Dr. Chris Barnhart and his students from Missouri State University have made several discoveries concerning the reproduction and life cycle of some rare Kansas mussels. His work identified the fish hosts for the rabbitsfoot, Neosho mucket, western fanshell and Ouachita kidneyshell. He is shown here next to one of the best mussel beds on the Verdigris River.

© Bob Gress

Threeridge

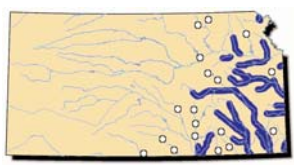
Amblema plicata

Kansas status: Common in eastern Kansas

Comments: This thick-shelled mussel gets its name from the three prominent ridges (sometimes two or four) that are easily noticed. On older specimens, the periostracum (external layer) is worn off the umbos and they appear white. Shellers called them "old gray beards." In some Kansas rivers, the threeridge is the most common mussel. This species does well in rivers and streams and can tolerate more pollution than other native mussels. Its glochidia are released from late spring to early summer. Threeridge shells were extensively utilized in the pearl button and cultured pearl industries due to their thickness and unblemished nacre.

Fish hosts: shortnose gar, white and black crappie, green sunfish, bluegill, warmouth, largemouth bass, channel catfish, flathead catfish, highfin carpsucker and sauger

Length: to 7 inches



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■ *Purple Wartyback*

Purple Wartyback

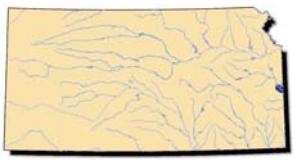
Cyclonaias tuberculata

Kansas status: Rare in Marais des Cygnes River

Comments: As the name implies, the purple wartyback has pustules (bumps) on the exterior of its dark brown shell. Internally, the nacre is a coppery-purple color. Because of this colored interior, it was never valued for the button industry. Its shell appears more rounded as compared to other thick-shelled species. Within Kansas, its distribution and abundance is limited to the lower reaches of the Marais des Cygnes River. However, further downstream in Missouri it was noted as the most abundant shell of the mussel community. It is widespread across the eastern United States but is seldom common at any location. In some of the Great Lakes drainages, the purple wartyback has returned to rivers where water quality has improved.

Fish hosts: channel catfish, flathead catfish, yellow bullhead and black bullhead

Length: to 6 inches



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■ *Spike*

Spike

Elliptio dilatata

Kansas status: Species-in-need-of-conservation

Comments: The spike is an elongated, heavy, smooth-shelled mussel. The older shells are dark brown and the bottom margin is slightly arched. It could be mistaken for the kidneyshell or spectaclecase mussels. The nacre may be dark purple, lilac, pink, salmon, bluish-white, white or a combination of these colors. It is normally found partially buried within swift currents of gravel or cobble substrate. The spike is known for the occasional black pearl it produces. Another name sometimes used for the spike is ladyfinger. It is found in the Spring, Neosho and Marais des Cygnes rivers but was once more widespread.

Fish hosts: black crappie, white crappie, flathead catfish, sauger and gizzard shad

Length: to 5½ inches

© Edwin Miller

■ *Wabash Pigtoe*

Wabash Pigtoe

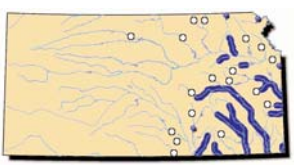
Fusconaia flava

Kansas status: Species-in-need-of-conservation

Comments: The Wabash pigtoe has no external bumps, waves or rays to help identify it. Its shape can vary from being nearly round to very elongate. The external color is reddish or yellowish-brown, becoming darker with age. Darker growth-rest lines (rings) are often obvious. Inside, the nacre is white, salmon or rose pink. It is often mistaken for the round pigtoe. The orange foot color is a helpful identifying characteristic, contrasting with the tan to whitish foot of the round pigtoe. The Wabash pigtoe is found in rivers and large creeks of eastern Kansas. Its past distribution was farther north and west where relic shells can still be located in the Ninnescah, Chikaskia, Republican and South Fork Big Nemaha rivers. A closely related mussel, the Ozark pigtoe, is very similar to the Wabash pigtoe but is smaller, more flattened and of uniform shell thickness. It may occur in the Spring River of Cherokee County.

Fish hosts: bluegill, black crappie and white crappie

Length: to 4½ inches



© Edwin Miller

■ *Washboard*

Washboard

Megalonaias nervosa

Kansas status: Species-in-need-of-conservation

Comments: The washboard is the largest and probably the longest-lived freshwater mussel in North America. The shell exterior is nearly black and roughened (like a washboard) with ridges and grooves. Young washboards have a noticeable zigzag sculpturing in the umbo area that over time erodes to a smooth surface.It could be confused with large threeridge shells. Using growth-rest lines (rings) as reference, some authorities believe these mollusks can live over a century. Also, these mussels have been located in several archeological sites suggesting Indians used these large shells for plates, hoes or scrapers. The females release glochidia in late winter. There are several potential fish hosts for this species in Kansas rivers. The washboard can be found in the Marais des Cygnes, Fall, Verdigris and Neosho rivers and the lower end of Labette Creek.

Fish hosts: white crappie, black crappie, channel catfish, flathead catfish, black bullhead, brown bullhead, white bass, largemouth bass, freshwater drum, sauger and gizzard shad

Length: to 11 inches

© Edwin Miller

■ *Round Pigtoe*

Round Pigtoe

Pleurobema sintoxia

Kansas status: Species-in-need-of-conservation

Comments: This mussel is most easily confused with the Wabash pigtoe, although the round pigtoe is typically darker, less flattened and has a higher umbo than the Wabash pigtoe. Also, the younger round pigtoe has noticeable dark greenish rays that radiate from the umbo region. If identification is still in question, the pigtoe can be slightly pried open to examine the internal tissue coloration. The foot of the round pigtoe is light tan-gray to white while the Wabash pigtoe has an orange cast. The nacre in the round pigtoe is usually white, but pink, rose and salmon colors can be found in limited numbers and make the shell interior very striking. The round pigtoe appears to be declining across its range. In Kansas, however, its population may be increasing in the Verdigris River.

Fish hosts: bluntnose minnow, spotfin shiner and bluegill

Length: to 4½ inches

© Edwin Miller

Rabbitsfoot

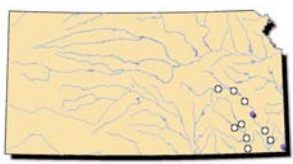
Quadrula cylindrica

Kansas status: Endangered

Comments: The rabbitsfoot is named for its general shape. Its length is about three times longer than its height. The elongate, greenish-brown shell has a row of knobs and often exhibits a beautiful pattern of dark triangles. It is one of the rarest mussels in Kansas. It is found in clear streams with swift current flowing over stable gravel substrates. Specimens can be found in the Spring River and a short stretch of the mid-Neosho River. The Verdigris River currently contains chalky, long dead specimens only. However, surveys in Oklahoma recently discovered an extant population below Oologah Reservoir. So, propagating and reintroducing juveniles to sites upriver in Kansas remains a possibility to help recover this species.

Fish hosts: bluntface shiner, cardinal shiner, red shiner and spotfin shiner

Length: to 5 inches



© Edwin Miller

■ *Monkeyface*

Monkeyface

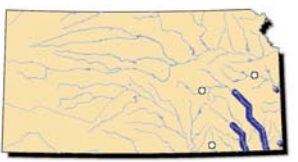
Quadrula metanevra

Kansas status: Common in some southeast Kansas rivers

Comments: The monkeyface has a very prominent posterior ridge and is sometimes strikingly marked with dark triangles. By viewing the shell edge-on and using your imagination you can see the face of a monkey. It is a river species and is most common in riffles and swift runs. Because of its heavy shell, white nacre and decent numbers, it was also targeted in the button and cultured pearl industry. Its population density has apparently been increasing at some sampling sites in southeast Kansas. This is a positive sign for all native mussels. However, it is absent above some of the large mainstem reservoirs in southeastern Kansas.

Fish hosts: green sunfish and bluegill

Length: to 4½ inches



© Edwin Miller

■ *Wartyback*

Wartyback

Quadrula nodulata

Kansas status: Species-in-need-of-conservation

Comments: The wartyback is a straw-colored mussel that looks very similar to its closest relative, the pimpleback, but differs by having fewer and larger pustules on the shell. These knob-like structures are most notably arranged in diverging rows exactly opposite the knobs on the opposing valve. These features are an adaptation to help this mussel stay anchored in the substrate, especially during flood conditions. In addition to the pimpleback, the wartyback can also be confused with the threehorn wartyback. Another characteristic to help differentiate this shell is a pronounced wing on the posterior portion of the shell. The wartyback is found in most southeast Kansas rivers but is not numerous. Within some of the best Verdigris River mussel beds, one wartyback will be found for every 100 mussels identified.

Fish hosts: black crappie, white crappie, bluegill, largemouth bass and channel catfish

Length: to 2¾ inches

© Edwin Miller

■ *Pimpleback*

Pimpleback

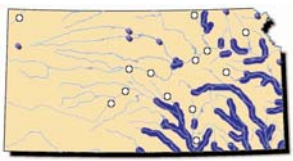
Quadrula pustulosa

Kansas status: Common in southeast Kansas

Comments: The pimpleback usually has pustules on its shell but sometimes it can be found without this characteristic and the shell is smooth. The overall appearance is circular with the exception of a squared-off posterior margin. It is a common mussel where found and is typically in the top three mussel species in abundance at river sample sites in southeast Kansas.

Fish hosts: shovelnose sturgeon, black bullhead, channel catfish, flathead catfish, bullhead and white crappie

Length: to 4 inches



© Edwin Miller

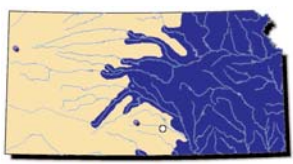
■ *Mapleleaf*

Mapleleaf

Quadrula quadrula

Kansas status: Common in eastern third of Kansas; also Smoky Hill and Solomon rivers

Comments: The mapleleaf shell's shape resembles its namesake. A noticeable ridge, with an adjacent valley (finger groove), is consistently apparent in the external shell structure. This groove, or sulcus, is often bordered by a row of pustules lining each ridge. This mussel species has the most shell variability across its wide geographical range in North America, creating taxonomic struggles. It is unique in having the flathead catfish as its only known fish host. Without this fish present, the mapleleaf would eventually disappear. Because host fish can gain immunity from past glochidia infestations, it is necessary that young flathead catfish be produced each year to be suitable candidates to host mapleleaf glochidia. The mapleleaf is found in a wide array of habitats including small sandy streams in western Kansas, backwater pools within larger rivers and even large reservoirs. This suggests it is a generalist species and more tolerant of pollution than other mussels.



Fish host: flathead catfish

Length: to 5 inches

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Pistolgrip

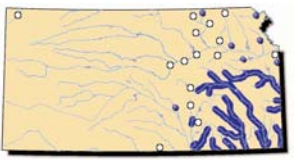
Tritogonia verrucosa

Kansas status: Common in southeast Kansas

Comments: With the general shape of a pistolgrip, this mussel is easily identified. The sexes differ in shape as the female is more elongated than the male. Recent research has also shown pistolgrips will move toward each other as spawning season approaches. This may help ensure the eggs within the female's gill pouches are fertilized because the male simply releases sperm into the open water. Its fish hosts are all in the catfish family and some authorities believe it uses scent to attract these host fish to enhance its chances of completing its life cycle. The pistolgrip is found in rivers and streams with permanent flow and occasionally in reservoirs.

Fish hosts: flathead catfish, black bullhead and yellow bullhead

Length: to 7 inches



© Bob Gress

Pondhorn

Uniomerus tetralasmus

Kansas status: Common

Comments: As the name implies, the pondhorn is typically found in ponds, small lakes or the pooled headwaters of small streams. It has the unusual capability of going dormant in dry conditions by burying itself deeply in the mud. It can survive exposure to air for up to 578 days at 59° F. To conserve water, it will plug its siphons with mucous. After sufficient rainfall, it will resume life processes by siphoning water over its gills. This mussel has a unique distinguishing characteristic: two shallow parallel grooves extending from the umbo area outward to the posterior margin. The color of the periostracum sometimes abruptly changes from yellow to dark brown at a growth-rest line (ring). The shell is relatively smooth but may have a slight ridge where these rest lines are located. Because of its relatively thin shell, the pondhorn is often eaten by muskrats. It is widespread and is one of the few species that can be found in southwest Kansas.

Fish host: golden shiner

Length: to 4½ inches

Subfamily Lampsilinae

The mussels within this subfamily often have shells that are sexually dimorphic (males and females are visibly different). Female shells are typically inflated. This provides more room for the females to brood her many young within her gill pouches. The glochidia from this group are all gill parasites. The females often have a developed visual lure as part of their mantle tissue that is inflated, extended and moved independently. This mantle tissue often realistically mimics a small baitfish or crayfish. Water clarity is essential for the host fishes to see the lures being displayed by these gravid females.

© Chris Barnhart

This female black sandshell is displaying to attract a host fish. When the host fish strikes the swollen white gill, they rupture and release glochidia. If all goes as planned, some of the glochidia will come in contact with the host fish's gills and snap closed. The sauger and walleye are known hosts for this species that often displays at night. The fish provides a mode of transportation for the "hitch-hiking" mussels to spread their progeny.

© Edwin Miller

■ *Mucket*

Mucket

Actinonaias ligamentina

Kansas status: Endangered

Comments: The mucket is a smooth, non-descript mussel and one of the rarest in Kansas. The large, heavy specimens found here appear to be old and well-worn. This would indicate very little reproduction has occurred in the last few decades. The shells are typically yellowish-brown with wide, greenish rays. There are numerous fish hosts known for the mucket. The female mucket usually releases her glochidia in June. In Kansas, it only occurs in the lower Marais des Cygnes River. East of Kansas, this species is described as common to abundant.

Fish hosts: largemouth bass, smallmouth bass, bluegill, green sunfish, orangespotted sunfish, white bass, black crappie, white crappie, sauger and tadpole madtom

Length: to 6 inches

© Edwin Miller

■ *Western Fanshell*

Western Fanshell

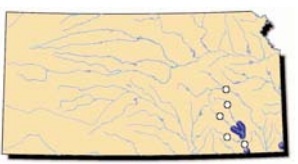
Cyprogenia aberti

Kansas status: Endangered

Comments: The western fanshell has a strikingly beautiful shell. Its wide, greenish, radiating rays give the shell a fanlike appearance. Mound-building Indians evidently revered this mussel as it has been found in various archeological/burial sites, so it may have been a prized food item. When gravid, the female fanshell slowly extrudes a white, worm-like lure (conglutinate) to attract its host fish, most being in the darter family. The core of this lure is composed of approximately 20,000 infertile eggs whose sole purpose is to give the lure a "life-like" appearance. The outer areas of the conglutinate are lined with live glochidia. If this lure is bitten by a host fish, the hookless glochidia become dislodged and some may successfully attach to the fish's gills. The female western fanshell may release up to 30 of these 2-3 inch lures during the early summer months as fish feeding becomes more active. This mussel lives in gravel beds under a swift current. It is found in the Fall, Verdigris and Spring rivers but has been extirpated from the Neosho River.

Fish hosts: fantail, orangethroat and slenderhead darters, logperch and banded sculpin

Length: to 3 inches



© Edwin Miller

Butterfly

Ellipsaria lineolata

Kansas status: Threatened

Comments: The butterfly has a dazzling, golden-yellow shell with dark, broken, radiating rays. The overall shape, when viewed at a distance, resembles its namesake. The shells are dimorphic as the male's shape is flatter than the female. The shell was once valuable in the button industry. Butterfly mussels reportedly are disappearing from many areas where they formerly were found. A few still inhabit the best mussel sites of the Fall, Verdigris, Neosho and Marais des Cygnes rivers. The fish hosts for the butterfly represent three different families of native fish.

Fish hosts: freshwater drum, green sunfish and sauger

Length: to 5 inches

© Edwin Miller

Plain Pocketbook

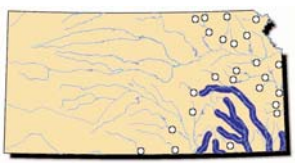
Lampsilis cardium

Kansas status: Common in southeast Kansas but probably declining

Comments: The plain pocketbook is relatively easy to identify because of its large umbos. However, male and female mussels of this species are dimorphic, meaning their shapes differ. The female is more inflated as she requires more internal space to brood her eggs within gill pouches each year. The male is longer and more pointed at its posterior end than the female. See pages 10-11 for a detailed account of plain pocketbook reproduction. The plain pocketbook is widespread but is never found in high numbers at any site. One intact shell was found in a Pleistocene bank deposit where mammoth and ground sloth bones were also buried.

Fish hosts: bluegill, largemouth bass and sauger

Length: to 7 inches



© Edwin Miller

■ *Neosho Mucket*

Neosho Mucket

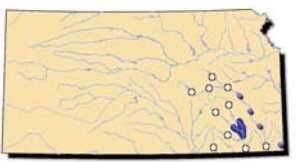
Lampsilis rafinesqueana

Kansas status: Endangered

Comments: The younger shells of the Neosho mucket are bright yellow and often marked with greenish rays and chevrons. As the mussel ages, it turns dark brown but often retains the green rays. The adults become moderately large and are sexually dimorphic in shape. This mussel could be confused with the plain pocketbook or the mucket. However, the Neosho mucket has lower umbos than the plain pocketbook and it does not occur in the same river basin as the mucket. Insufficient numbers of bass in the lower Neosho, Fall and Verdigris rivers may be a factor in the decline of the Neosho mucket. Unfortunately, most of the individuals there appear to be well-worn and old. However, the Neosho mucket is one of the predominant mussels in a short stretch of the Spring River. Juvenile Neosho muckets produced by artificial propagation in a fish hatchery have been successfully introduced into the Fall and Verdigris rivers, presenting some hope of replenishing the species throughout its range.

Fish hosts: largemouth bass, smallmouth bass and spotted bass

Length: to 6½ inches



© Edwin Miller

■ *Fatmucket*

Fatmucket

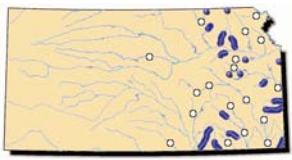
Lampsilis siliquoidea

Kansas status: Species-in-need-of-conservation

Comments: The fatmucket is sexually dimorphic in shape. With age, females develop into a hatchet shape, the anterior end being much smaller than the posterior end. This difference is to provide more room to brood the eggs in her gills while the male's shape with age is more symmetrical. Like other *Lampsilis* mussels, the female displays a large lure to attract host fish. This lure is less fish-like than others within the *Lampsilis* group yet still attractive to a variety of host fish. The fatmucket is more likely found in smaller streams and can be found in some reservoirs.

Fish hosts: white sucker, bluegill, orangespotted sunfish, smallmouth bass, largemouth bass, white crappie, black crappie, walleye and sauger

Length: to 6½ inches



© Edwin Miller

■ *Yellow Sandshell*

Yellow Sandshell

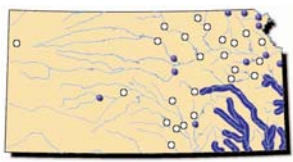
Lampsilis teres

Kansas status: Species-in-need-of-conservation

Comments: The yellow sandshell is a long and rather narrow mussel. Because of its color and shape some of the old shellers would refer to it as the "banana boat," while another colloquial name is "bank creeper" because it tends to crawl around. It is sexually dimorphic, with the female being slightly more bulged in appearance than the male. The female has a mantle lure to entice fish into close range to enhance the probability of glochidia encystment on the host fish. This mussel is widespread in Kansas but never reaches high densities in any location. It is better represented in southeast Kansas and is sometimes found in sparse numbers in reservoirs. Historically, the yellow sandshell was found farther north and west in Kansas streams where relic shells can be found as evidence of past occurrence.

Fish hosts: longnose gar, shortnose gar, black crappie, white crappie, largemouth bass and green sunfish

Length: to 5½ inches



© Edwin Miller

■ *Fragile Papershell*

Fragile Papershell

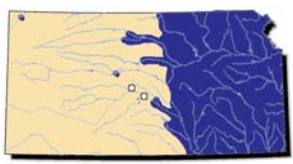
Leptodea fragilis

Kansas status: Common in eastern half of Kansas

Comments: The fragile papershell is a thin-shelled mussel that is consistently yellowish-tan in color. It can be considered a pioneer species, as it is often the first one to reinvade an area after a drought or flood deposition. It is often found deeply buried in the substrate with its foot extended to help anchor it. It could be considered a habitat generalist because it can be found in rivers, reservoirs and many smaller creeks with permanent pools. It is typically one of the mussels species found where only a few species are represented. It can be mistaken for the pink papershell, but the fragile papershell is less rounded along the ventral margin and usually a lighter color in comparison.

Fish host: freshwater drum

Length: to 6¼ inches



© Edwin Miller

■ *Pondmussel*

Pondmussel

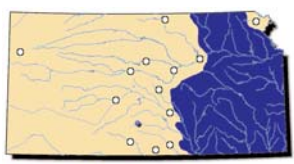
Ligumia subrostrata

Kansas status: Common in eastern half of Kansas

Comments: Unlike its cousin, the black sandshell, the pondmussel is common in Kansas. It is found in decent numbers in a large variety of habitats including ponds and pools of small streams or rivers. The pondmussel can withstand the drying conditions often associated with pond habitats by surviving for long periods in the moist substrate. Like other mussels in this group, the female is more inflated and is not nearly as pointed at the posterior end to provide space for the numerous maturing eggs and glochidia. The most defining character of this shell is the noticeable fine ridges (sculpturing) on the umbo that are drawn up in the center appearing as inverted Vs. The dark brown shell may have dark green rays but the shells tend to blacken with age. The nacre is bluish-white.

Fish hosts: orangespotted sunfish, green sunfish, bluegill and largemouth bass

Length: to 3¾ inches



© Bob Gress

■ *Threehorn Wartyback*

Threehorn Wartyback

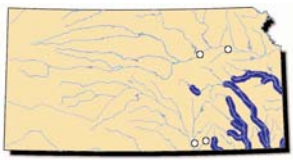
Obliquaria reflexa

Kansas status: Common in southeast Kansas

Comments: The threehorn wartyback typically has three large protruding pustules on its shell which led to its common name. However, sometimes two or four of these pustules are found on each valve. These pustules are arranged alternately from the ones on the opposite valve. The similar-appearing wartyback (*Q. nodulata*) has pustules arranged opposite the ones on the opposing valve. The threehorn wartyback is a river species, and it ranks near the top in overall density at several sample sites. It is seldom found in small streams. The female releases glochidia in the late spring to early summer. There is some speculation this mussel does not always require a fish host to metamorphose from the larval to the juvenile stage. More research is needed to clarify the life history of this shell.

Fish host: unknown

Length: to 3¼ inches



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■ *Pink Heelsplitter*

Pink Heelsplitter

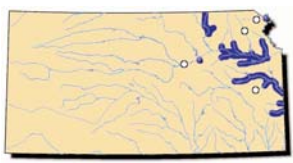
Potamilus alatus

Kansas status: Common in Marais des Cygnes and Kansas river basins

Comments: The pink heelsplitter gets its name from the large, flat wing often found extending from the dorsal side of the shell. This "wing" has a very narrow edge and if stepped on, might easily injure a person's bare foot. The shell's interior has a showy, purplish-pink nacre that may be tinged with a bronze color. Young shells have green rays that fade with age. The glochidia within this genus *Potamilus* are uniquely hatchet-shaped. Other mussels have round-shaped glochidia. Research has shown this species can be utilized in the culture of purple pearls. Other colloquial names for the pink heelsplitter are "hatchetback" and "pancake." In Kansas, the pink heelsplitter is restricted to the Kansas and Marais des Cygnes river basins. In these flowing waters, it is more commonly found in pools and sluggish areas where it can be found in a mix of gravel and silt substrates.

Fish host: freshwater drum

Length: to 8 inches



© Bob Gress

■ *Pink Papershell*

Pink Papershell

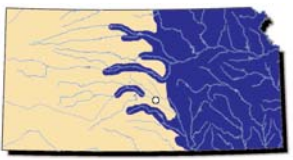
Potamilus ohiensis

Kansas status: Common in east half of Kansas

Comments: Externally, the pink papershell is flattened with a dorsal wing that becomes jagged with age. The shell color is chestnut brown and has a shiny luster. As the name implies, the shell is very thin with dark pink or purple nacre from margin to margin. The shell from a dead specimen may crack as it dries. It is often confused with the fragile papershell, but differs in having a more rounded ventral surface and a darker shell color. The pink papershell is most common in still water but can occur in low numbers in rivers. It can be found in central Kansas within several sandy streams and the Arkansas River. Because it is adapted to live in ox-bow environments, it sometimes reaches high numbers in some reservoirs. It apparently does well in silty substrates that many other species cannot tolerate. It has been used in studies to detect the toxic effects of ammonia.

Fish hosts: freshwater drum and white crappie

Length: to 6 inches



© Edwin Miller

■ *Bleufer*

Bleufer

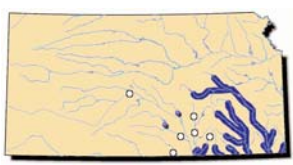
Potamilus purpuratus

Kansas status: Common in southeast Kansas

Comments: The bleufer is best known for its brilliant purple nacre which gives it the scientific name *purpuratus*. It is sometimes called "purple shell." Externally, the bleufer has a very dark periostracum and a slight wing arising on its dorsal side. It is one of the larger mussels in Kansas. The female is more inflated and truncated toward the posterior end. Because of its colored nacre and large size, it has been used in the past for jewelry inlays. It is most confused with the pink heelsplitter. In similar sized shells, the bleufer has a more inflated, heavier shell and the ventral margin is nearly straight. The bleufer appears to be a habitat generalist and can be found in pools, riffles and runs of rivers and is often present in reservoirs and below low-head dams. This is a southern Mississippi River Basin species and is at the northwest periphery of its range in southeast Kansas.

Fish host: freshwater drum

Length: to 7 inches



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■ *Ouachita Kidneyshell*

Ouachita Kidneyshell

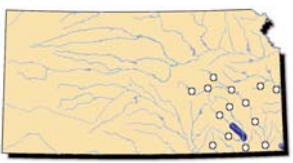
Ptychobranchus occidentalis

Kansas status: Threatened

Comments: The Ouachita kidneyshell is an Ozarkian mussel that only occurs in a small portion of four states: Kansas, Oklahoma, Arkansas and Missouri. The shell is flattened, heavy for its size and kidney-shaped. The greenish-yellow external shell typically has several distinct fine-lined green rays radiating outward from the umbo. It can be mistaken for the spike mussel, especially where the two co-exist. See pages 8-9 for a detailed account of Ouachita Kidneyshell reproduction. This mussel is mainly found in riffles and shallow runs within the Fall, Verdigris and Spring rivers. Relic shells only are found in the Neosho River.

Fish hosts: orangethroat darter and greenside darter

Length: to 4½ inches



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■ *Lilliput*

Lilliput

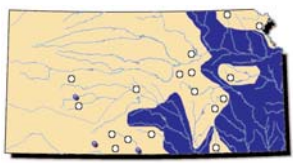
Toxolasma parvus

Kansas status: Common in southeast Kansas

Comments: Even as an adult, the lilliput is an apt name because this mussel is one of the smallest in the family (Unionidae). The outermost layer of the dark brown shell has a cloth-like texture feeling like wet leather. Inside the shell, the nacre is bluish-white. It can be confused with the pond mussel, however, unlike the inverted Vs of the pond mussel, the lilliput has concentric lines near the umbo. The female has a distinctive lure which resembles two creamy white worms extending from the shell, and can move these lures to entice a host fish. It is most often found in ponds or lakes but can be found near pool margins of fast-flowing streams.

Fish hosts: bluegill, green sunfish, orangespotted sunfish, warmouth and white crappie

Length: to 1¼ inches



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■ *Fawnsfoot*

Fawnsfoot

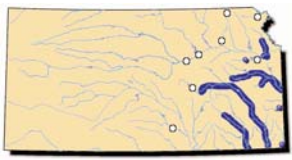
Truncilla donaciformis

Kansas status: Species-in-need-of-conservation

Comments: The fawnsfoot is one of the smallest mussels in Kansas rivers. The markings on the shell are striking because they look like zigzags, scribbles or wide, dark rays on a background of golden to light brown. Fawnsfoot mussels can sometimes be found washed up along the shoreline of reservoirs. The juvenile fawnsfoot produces a byssal thread it attaches to a small rock or even a nearby larger mussel shell. These act as anchors to keep this small mussel from being washed downstream. The only known host fish in Kansas is the freshwater drum, a fish well known for its appetite for small mussels. The fawnsfoot is found in the rivers of eastern Kansas.

Fish host: freshwater drum

Length: to 2¼ inches



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Deertoe

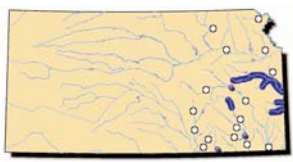
Truncilla truncata

Kansas status: Species-in-need-of-conservation

Comments: This is a very well-marked mussel with a shell showing numerous greenish rays, chevrons or zigzag patterns on a background of yellowish, greenish or reddish-brown. The nacre is white or various shades of pink. It is closely related to the fawnsfoot, but is larger with a more sharply angled posterior margin. It is generally more triangular-shaped which reflects its common name, the deertoe. It can be found in several southeast Kansas rivers and streams. It appears to be rare below some reservoirs, suggesting fish are unable to transport the juveniles to these locations because the dams act as barriers to dispersal.

Fish host: freshwater drum and sauger

Length: to 3 inches



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Ellipse

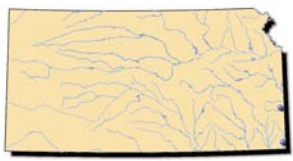
Venustaconcha ellipsiformis

Kansas status: Endangered

Comments: As a full-grown mussel, the ellipse is still relatively small. The straw-colored shell has numerous dark rays that radiate from the umbo of the shell. It is a mussel restricted to small, upland Ozark streams. In Kansas, it is only found in the Spring and Marmaton rivers. It is dimorphic with the male being narrower in height than the female. Typically, the females release glochidia in the early morning hours. The glochidia must attach to a host fish or they will perish. The number of glochidia released per female is directly related to her size.

Fish hosts: Johnny darter, orangethroat darter, fantail darter and banded sculpin

Length: to 3 inches



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Spectaclecase

Cumberlandia monodonta

Kansas status: Extirpated

Comments: The spectaclecase has an elongated shell, its length being three times its height. The ventral surface is concave which gives the shell a banana-shaped appearance. The color is dark brown turning toward black with age. The spectaclecase is found between and under the edges of large boulders in deep stretches of rivers. This habitat is not typical of most other mussels which usually inhabit gravel or silt substrates. Relic shells were recently found in the Marais des Cygnes River but no live individuals have been found in Kansas.

Fish host: unknown

Length: to 8 inches

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Slippershell

Slippershell

Alasmidonta viridis

Kansas status: Extirpated

Comments: This mussel has a smooth, yellowish shell with the exception of some umbo sculpture consisting of coarse looped ridges. The shell is thin and strong with green rays radiating from the umbo region. It is largely a headwater species, being best-adapted to small streams. Its habitat consists of gravel substrates in cool, spring-fed streams. Weathered shells of this species have been found in Marais des Cygnes tributaries. This species is also present within the Spring River basin of Missouri and could be found near the Kansas-Missouri border in Cherokee County.

Fish hosts: banded sculpin and Johnny darter

Length: to 1½ inches

Snuffbox

© Edwin Miller

Epioblasma triquetra

Kansas status: Extirpated

Comments: The snuffbox is within a very environmentally sensitive group of mussels. Several *Epioblasma* species have gone extinct and numerous others are federally endangered east of Kansas. This sensitivity holds true for the snuffbox as well because it has not been found within Kansas since the early 1900s, when degraded water quality began to affect aquatic life. Relic shells have been documented in the Wakarusa and Marais des Cygnes rivers. In neighboring states, this mussel inhabits riffles and runs with swift current and sandy gravel or gravel-cobble substrates in nearly pristine environments. Males are oval in shape and flattened while the females are elongated and pointed at the posterior end. The snuffbox female uses a lure to attract the logperch (its only known fish host). While attempting to eat the lure, the logperch's nose is trapped by the mussel as the shell clamps shut. The host fish is held for a short period of time while the snuffbox female billows her glochidia into the fish's mouth. This strategy greatly improves the chances the glochidia come in contact with the logperch's gills. After this encounter, the host fish is released. Other species of fish have been known to die from this bizarre encounter.

Fish host: logperch

Length: to 3 inches

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Creek Heelsplitter

Creek Heelsplitter

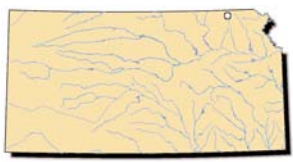
Lasmigona compressa

Kansas status: Extirpated

Comments: The creek heelsplitter has been found as an old relic shell in the Nemaha River basin so there is evidence it once occurred in Kansas. This species is closely related to the white heelsplitter and the flutedshell, but differs from these two by having lateral teeth that interlock. The general shape closely resembles the flutedshell without the flutes showing on the posterior end. It remains extant in the upper Midwest and east to Ohio where it inhabits creeks and headwaters of small rivers. However, this species is listed as threatened in Iowa and Illinois.

Fish host: black crappie

Length: to 4 inches



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■ *Black Sandshell*

Black Sandshell

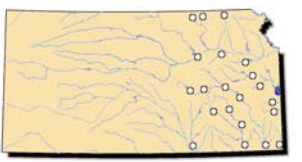
Ligumia recta

Kansas status: Extirpated

Comments: The black sandshell resembles the yellow sandshell in shape, however, it gets larger, darker, has a straighter dorsal margin and is less inflated than the yellow sandshell. This mussel is sexually dimorphic with the female more inflated near the posterior margin. The black sandshell does not have a viable population in Kansas, but it was considered common in southeast Kansas rivers in the early 1900s. Bleached, white relic shells are found along many gravel bars as evidence of its past existence. An old, living male specimen was found in the Marais des Cygnes River in 2001. However, no others have been located, even after extensive surveys at other suitable sites. The black sandshell is typically found in clear streams with stable gravel substrate. Because of its elongated shell and bright nacre, it was utilized for inlay work on pearl handled knives. When the female is gravid, she displays a brilliant pulsating white lure to attract a host fish.

Fish hosts: walleye, sauger, American eel, bluegill, largemouth bass and white crappie

Length: to 8 inches



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Hickorynut

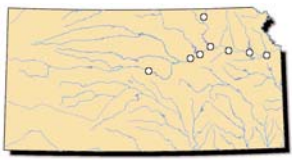
Obovaria olivaria

Kansas status: Extirpated

Comments: Based on the discovery of relic shells found in the Kansas, Ninnescah and Smoky Hill rivers, we know the hickorynut once occurred here. Thus, it is now considered extirpated. Outside Kansas, this species is found in medium to large rivers in sand and gravel substrates. It has a thick, rounded shell with inflated umbos. External color is tan to brown with faint dark rays extending from the umbo that fade out half-way down the shell. It could be confused with the round pigtoe or the pimpleback. There is only one known fish host, which may be an important reason why it disappeared from Kansas.

Fish host: shovelnose sturgeon

Length: to 3 inches



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Winged Mapleleaf

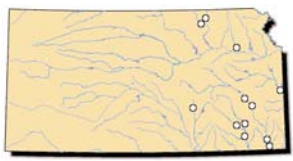
Quadrula fragosa

Kansas status: Extirpated (federally endangered)

Comments: This mussel, largely similar to the mapleleaf, differs in having a straight dorsal edge and a pronounced wing sculpted with coarse corrugations. Internally, the nacre is white and the lateral teeth are long, straight and parallel to the dorsal margin. Careful examination of a live shell will reveal the mantle edge has a black margin. This species no longer exists in Kansas and has critically declined across its once broad range within the Mississippi River basin to the extent it is now listed as federally endangered. Old shells have been found across eastern Kansas where it evidently once occurred in rivers and large creeks.

Fish hosts: channel catfish and blue catfish

Length: to 5 inches



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Pyramid Pigtoe

Pyramid Pigtoe

Pleurobema rubrum

Kansas status: Extirpated

Comments: Shells of the pyramid pigtoe are frequently found in the bank deposits of southeast Kansas rivers. They are similar to the round pigtoe but the umbos are so pronounced and pointed, it is probable they are the pyramid pigtoe. It could be argued these are a variant of the round pigtoe, but it would take soft tissue to perform genetic analysis to verify this fact. Live specimens from Kansas probably no longer exist. This species is still found in Ohio and malacologists (scientists who study mollusks) there identified the relic Kansas shells as the pyramid pigtoe. Therefore, it is included here as an example of a mussel species that no longer exists in Kansas.

Fish hosts: black crappie

Length: to 3 inches

© Jim Mason

■ *Asiatic Clam*

Asiatic Clam

Corbicula fluminea

Kansas status: Invasive exotic

Comments: This exotic clam is relatively small and can be readily identified by the evenly-spaced concentric ridges. The color of the younger specimens is usually bright yellow that gradually becomes darker yellow to dark brown and almost black with age. Internally, there are interlocking lateral teeth on each side of the umbo. Unlike native mussels, it does not use a fish host. It was introduced to the United States in the 1930s from the Orient. Most authorities attribute its spread upstream and across watershed boundaries to boating and fishing activities. Since about 1980, it has become widespread and common in Kansas. The consequences associated with this exotic introduction are not yet understood. On a lighter side, if one were to elect to eat mussels, this species would be a superior choice as it is an exotic, relatively short-lived species and is often consumed as food worldwide. However, one should keep the water quality source in mind as a majority of Kansas rivers probably contain contaminants that can accumulate within the tissues of most mollusk species.

Fish hosts: none used or required

Length: to 1½ inches

© Marc Murrell

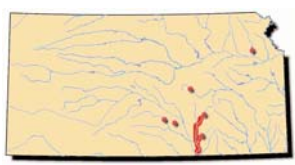
■ *Zebra Mussel*

Zebra Mussel

Dreissena polymorpha

Kansas status: Invasive exotic

Comments: Zebra mussels are so named because of their alternating cream and black stripes on small triangular-shaped shells. They were introduced to the Great Lakes in the 1980s from Eurasia when ballast water was dumped from sea freighters. They have spread up and down the major navigational waters from the Great Lakes to the Gulf of Mexico via barge traffic and have been largely transported to Midwestern reservoirs and smaller river systems via fishing and boating activities. Unlike our native mussels, no fish host is needed to complete the life cycle. A female will produce free-living veligers at the rate of tens of thousands to hundreds of thousands annually. This equates to rapid population expansion once established. They have been reported to produce densities of 30,000 to 40,000 per square meter. The ability of this species to attach (bio-encrust) has made it a potential menace to any utility that pumps water through pipes. It has the ability to clog 3-foot diameter pipes that transport water. Efforts continue to keep them out of Kansas waters, yet they have successfully invaded El Dorado, Cheney, Marion and Perry reservoirs, Lake Afton, Winfield City Lake and the rivers below them. Kansas has a great potential to experience huge economic and ecological losses as a result of zebra mussel infestations.



Fish hosts: none used or required

Length: to 1½ inches

Glossary

byssal thread – a fibrous string that anchors a small mussel to a larger object
extant – population exists in specified area
extirpated – population is gone from specified area (locally extinct)
fluting – repeated ridges and valleys alternately arranged
glochidia – larvae of unionid mussels that have not transformed to juveniles
hinge – the edge of the shell where the two valves are physically connected
iridescent – displaying rainbow-like colors that shift with lighting angle
lateral teeth – the elongate, interlocking ridges on the hinge line of each valve
nacre – the pearly interior of a mussel shell that may vary in color
mantle – the fleshy tissue that is attached to the nacre and envelops a mussel's soft parts
mollusk – an animal group that includes mussels, clams, oysters, snails, squid and octopuses
pallial line – the indented groove on the inner shell surface, roughly parallel to the ventral edge, that marks where the mantle was formerly attached
periostracum – the outermost external layer of a shell
pseudocardinal teeth – the interlocking tooth-like structures located near the umbo
pustule – a small bump or knob
rays – a solid or broken stripe on the periostracum that usually radiates from the umbo
relic – a dead shell that has weathered
sculpture – raised portions on the shell exterior that form lines, ridges or pustules
sulcus – a narrow shallow shell depression extending from umbo to ventral margin
umbo – the area of the shell first to form (sometimes called the beak)
valve – one of the halves of a shell
veliger – free-swimming larva that does not require fish host attachment to mature to juvenile stage
wing – a thin posterior extension of the shell most notable on heelsplitters

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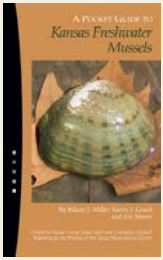

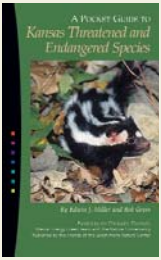

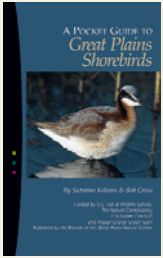

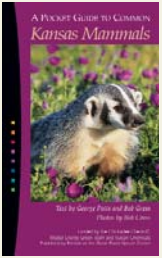

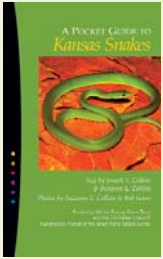

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